

## ***Interactive comment on “Determining flow directions in river channel networks using planform morphology and topology” by Jon Schwenk et al.***

**Maarten Kleinhans (Referee)**

m.g.kleinhans@uu.nl

Received and published: 21 July 2019

This manuscript presents algorithms to improve river and delta channel networks derived from water/land-binarised and skeletonised imagery, specifically to assign flow directions to the links between channel nodes. The set of algorithms is tested against expert judgement and found to be accurate. As such the manuscript adds to a growing family of channel network production tools needed for graph-related and other network analysis tools. The paper is mainly method-oriented and presents no tests or explanations why certain algorithms were added to, or left out of, the workflow. There is some data analysis but very little discussion and comparison to work done in the literature.

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While this can potentially be repaired, it requires doing such analyses and writing a paper about it, with much of the present manuscript in a supplement, suggesting rather major revisions.

In general the paper is very difficult to read as anything other than a recipe for accomplishing something, and what I would expect for this journal is emphasis on that something. For example, section 3.1 is very hard to read and is probably much better understood when graphically presented in schematics. It almost reads as a cooking recipe that tells the reader to add an ingredient without explaining why, and without explaining what would happen without it or with an alternative ingredient. Perhaps this can be resolved by much better figures that explain what the method does and what comes out of it, placing much of the present technical material in a supplement and focussing the paper on the science rather than the method. The evaluation can also be part of that, including explanatory reasons why those few links went wrong because that may tell us something very interesting about the method, why it works, and what basic understanding it embodies about fluvial systems. Or perhaps this manuscript is more suitable for another journal, if not a supplement to a paper about the science.

Detailed comments by figure and line numbers:

Text and figures are cluttered by abbreviations, many of which can be resolved. For instance DPA is unnecessary because the entire paper is about that thing so why not name the subalgorithms by the name that says what they do.

Figures are unclear and not so suitable in background choice for journal publication. This can easily be resolved.

Polish needed: there are multiple grammatical and spelling errors and figure panels need letters for reference in captions.

Fig1: black background is beautiful for presentation but make more readable white background for the paper. This also applies to some other figures.

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Fig2: if in DPA\_mdc colours between equation and schematics are supposed to correspond then something is wrong. The caption refers to the text for symbology, but readability would really improve if a figure explains that symbology. It says 'min dir change DPA\_mdc' with different  $\omega_{ang}$  in multiple places, but why and why these values cannot be understood from the figure. It says DPA everywhere so that is clearly redundant.

Fig 3: likewise, this fig is very very hard to read with all the unexplained symbology. Perhaps put in the supplement and make a fig for the paper that explains rather than technically records what the recipes do. For braided rivers the cycles are not connected to the rest, and that bit is the same as in the deltas so for clarity merge the two.

Fig4: again nice for presentation but as a figure it does not work. Why not make blue links for downstream and red for upstream with gray in between and white background.

Fig6: Nice results, but write out meaning of legend so it becomes readable

40 missing the most important problem here: bed slopes are nearly as much upward in downstream direction because of shoals and bifurcations, which requires a very different method to get the networks (Kleinhans et al. 2017, Van Dijk et al. 2019).

46,51 then why is there this remark in the online supplement readme that "Important: The Colville, Kolyma, Lena, Mackenzie, Yenisei, and Yukon channel network masks are not included in these Supplementary Data, as they were painstakingly created by Anastasia Piliouras"? What was so much work about it?

136 why this weight? this needs arguments and support. In Marra et al (cited in the paper) we tested and discuss a number of possibilities in view of fluvial morphodynamic functioning.

The link to the data <https://doi.org/10.15485/1505624> leads to the repository but gives a blank page as result.

References

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van Dijk, W.M., Hiatt, M. R., van der Werf, J. J., & Kleinhans, M. G. (2019). Effects of shoal margin collapses on the morphodynamics of a sandy estuary. *Journal of Geophysical Research: Earth Surface*, 124. <https://doi.org/10.1029/2018JF004763>

Note: this paper comes from a community where the authors are in alphabetical order. Willem Sonke is the lead author and did this work as part of his PhD thesis. Kleinhans, M., M. van Kreveld, Tim Ophelders, W. Sonke (lead author), B. Speckmann (PI), and K. Verbeek (2017). Computing Representative Networks for Braided Rivers. 33rd International Symposium on Computational Geometry (SoCG 2017), pp. 48:1-48:15. Editors: Boris Aronov and Matthew J. Katz. <http://dx.doi.org/10.4230/LIPIcs.SoCG.2017.48>

Maarten G. Kleinhans, 21 July 2019

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Interactive comment on *Earth Surf. Dynam. Discuss.*, <https://doi.org/10.5194/esurf-2019-19>, 2019.

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